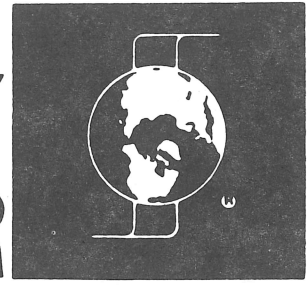


IEEE MAGNETICS SOCIETY NEWSLETTER



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RICHARD M. JOSEPHS, EDITOR

• SPERRY UNIVAC

• P.O. BOX 500

• BLUE BELL, PA 19424

AL SMITH, EDITOR IEEE TRANS. ON MAGNETICS, LEAVES

The Magnetics Society expresses its appreciation for the work done by Dr. Alan Smith, who recently retired as Editor-in-Chief. As such, he was responsible for the Transactions on Magnetism, the reviews, the Advances in Magnetism, and the Newsletter. Through his efforts, the prestige of the Transactions on Magnetism has continued its rise in the field of applied magnetism worldwide. The number of conference proceedings published in the Transactions has been increasing, thereby raising the value of the Transactions to Magnetism Society members. Over 3500 pages appeared in the Transactions last year, an outstanding tribute to the work of Smith and his editors. The Magnetism Society will continue to make use of Smith's talent and interests in other ways, but will miss his contributions to the publications field.

James M. Lommel, President
Magnetism Society



Prof.
Stanley H. Charap

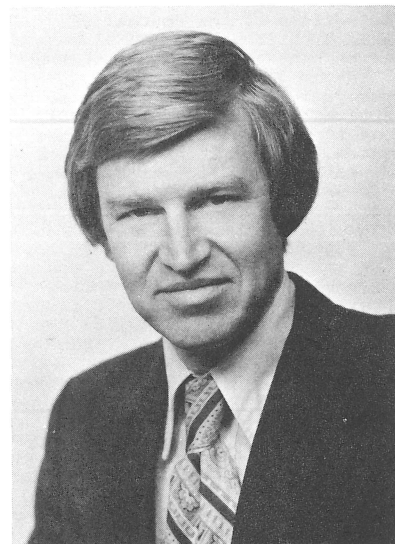
at the Wolfson Centre for Magnetism Technology in Cardiff, Wales, U. K. Professor Charap's research has included spin wave theory, anisotropic exchange, exchange anisotropy, magnetic bubble lattice properties, current-domain wall interactions, perforated conductor magnetic bubble devices, ferromagnetic resonance, and losses in electrical steels.

For the Magnetism Society, he has served as Reviews Editor of the Transactions on Magnetism from 1975 to 1980, member of the Administrative Committee since 1977, Intermag Program Committee member for 1978 and 1980, and Publications Chairman for the Joint MMM-Intermag in 1979. He has been a member of the Advisory Committee of the MMM Conference from 1973 to 1976 and again since 1978, and Treasurer of the 1981 MMM and of the 1982 Joint Intermag-MMM. Effective January 1, 1982, Professor Charap is Editor-in-Chief of the Transactions on Magnetism and Publications Chairman of the Magnetism Society.

KEN LEE, NEW EDITOR OF ADVANCES IN MAGNETICS

Ken Lee is now the Editor of Advances in Magnetism. He has been an active member of the magnetism community for many years as the following biography demonstrates.

Dr. Kenneth Lee of the IBM Research Laboratory, San Jose, CA, was born in San Francisco on July 3, 1937. He received his B.A. and Ph.D. degrees in physics from the University of California at Berkeley in 1959 and 1963, respectively. His graduate work dealt with the magnetic properties of antiferromagnetic insulators. From 1963 to 1968, he was a research physicist at Varian Associates, Palo Alto, CA, working on electron and nuclear magnetic resonance phenomena in a wide range of solid materials. During this period, he was also a consultant to the Lawrence Radiation Laboratory, Livermore, CA. From 1968 to



Dr. Alan Smith

STAN CHARAP, NEW EDITOR-IN-CHIEF IEEE TRANS. ON MAGNETICS

On January 1, 1982, Stan Charap became the Editor-in-Chief of the IEEE Transactions on Magnetism. He replaces Al Smith, who had resigned having been the editor for the last five years. Stan is currently teaching at Carnegie-Mellon University and has been involved in many areas of magnetism as the following biography indicates.

Stanley H. Charap is Professor and Acting Head of Electrical Engineering at Carnegie-Mellon University in Pittsburgh, PA. He has his Ph. D. in Physics from Rutgers University and worked at IBM Research and at American-Standard Research before going to C-MU in 1968. In 1976 he was on leave for six months



Dr. Kenneth Lee

the present, he has been with the IBM Research Laboratory, San Jose, CA, as a research staff member and manager. He has worked in magnetic thin films, thin film technology, amorphous magnetic materials, and magnetic recording physics and technology. He is currently the manager of the Advanced Recording Head Project. He has published over 50 technical articles and has eight patents. He is a Fellow of the American Physical Society, a Senior Member of the IEEE, and a member of Phi Beta Kappa and Sigma Xi. He has been active in professional society activities and conferences. Among the positions he has held, he was Local Committee Chairman (1974) and Program Co-chairman (1975) of the Conference on Magnetism and Magnetic Materials, and Coordinator (1980) of the IEEE Magnetics Society Distinguished Lecturer Program. Recently, he was appointed to the Editorial Board as an Advisory Editor of the Journal of Magnetism and Magnetic Materials and he has accepted the position of Advances in Magnetics Editor for the IEEE Transactions on Magnetics.

“JAKE” JACOBS RECEIVES COOLIDGE FELLOWSHIP AWARD

Two scientists at the General Electric Research and Development Center recently were presented with Coolidge Fellowship Awards - the organization's highest honor - by Dr. Roland W. Schmitt, senior vice president for corporate research and development. The Fellowships, which recognize outstanding and sustained contributions to scientific research or engineering, were awarded to Dr. Israel S. Jacobs, physicist, and Dr. Richard P. Messmer, chemical physicist, at a special staff colloquium. Dr. Jacobs won the award for his contributions to applied science and fundamental research in the field of magnetism and magnetic materials and for his leadership within the scientific community. Dr. Messmer was cited for developing computerized, theoretical methods for predicting the properties and behavior of materials.

The Fellowship Awards were established in 1970 in honor of the late Dr. William D. Coolidge, GE vice president and director of research. He also was the

The IEEE Magnetics Society Newsletter is published quarterly by the Institute of Electrical and Electronics Engineers, Inc., 345 East 47 Street, New York, New York 10017. The objective of the Newsletter is to publicize activities, conferences, workshops, and other information of interest to the membership of the Society and technical people in the general area of applied magnetics. Copy is solicited from the S-MAG membership, organizers of conferences, officers of the Society and local chapters, and other individuals or organizations with potentially relevant material. Copy should be sent to Dr. R. M. Josephs, Editor, Magnetics Society Newsletter, Sperry Univac, P. O. Box 500, Blue Bell, Pennsylvania 19424.

inventor of the Coolidge X-ray tube and the ductile tungsten filament that is still at the heart of billions of incandescent light bulbs manufactured each year. Coolidge Fellows are chosen from candidates nominated by Center staff members. A committee of past Fellows and laboratory managers makes the final selection based on professional accomplishments and potential long-range benefits to the individual and the company. As part of the award, Coolidge Fellows are granted a leave for one year to pursue individual projects and special research interests. They may elect to spend the time at a university or research institute, within the company, or elsewhere, supported by the Center.

Dr. Jacobs is a native of Buffalo, N. Y. He received a B.S. degree in physics from the University of Michigan in 1947 and a Ph.D. in the same discipline from the University of Chicago in 1953. In 1954, Dr. Jacobs joined the Center, where he has conducted research in the areas of magnetism and magnetic materials, high magnetic field phenomena, low-dimensional magnetic model systems, and industrial applications of magnetics research. Dr. Jacobs' experiments resulted in an understanding of the phenomenon of super-paramagnetism, the tendency of extremely small particles of ferromagnetic metals to behave as if they were paramagnetic. He also invented a method for magnetically measuring the level of the element gadolinium in nuclear fuels and helped to characterize magnetic inclusions in diamond. At present, Dr. Jacobs is working with coal scientists to develop a means of magnetically removing sulfur from coal. In his most recent research, he has made a major breakthrough in high-temperature materials for application to the nation's defense technology. In addition, Dr. Jacobs was a co-founder of the Center's Visiting Research Fellowship Program, which has made it possible for scientists from universities around the world to spend from three months to one year at the Center conducting research alongside its staff members.

Active in the magnetics community, Dr. Jacobs organized many of the annual Conferences on Magnetism and Magnetic Materials co-sponsored by the American Institute of Physics and the Magnetics Society of the Institute of Electrical and Electronics Engineers. He has been a member of the board of editors of the Journal of Applied Physics and the International Journal of Magnetism, and currently is on the advisory board of the Journal of Magnetism and Magnetic Materials. Dr. Jacobs served for a three-year term on the Committee on Education for the American Physical Society (APS), and is currently chairman of that society's Committee on Opportunities in Physics. He has been a member of the selection committees for the APS Industrial Summer Intern Program since 1980 and for the APS Industrial Postdoctoral Fellowships since 1981.

The author of more than 80 technical publications, Dr. Jacobs holds four patents and has presented more than 80 invited talks to audiences from around the world. He is a Fellow of the American Physical Society, a Senior Member of the Institute of Electrical and Electronics Engineers, and a member of the American Association for the Advancement of Science.



Dr. Roland W. Schmitt, Dr. Israel S. Jacobs, Dr. Richard P. Messmer

REPORT OF THE DIV. IV DIRECTOR — ALLAN C. SCHELL

The regulation of technology transfer among nations is a topic of major importance to IEEE members, affecting both work arrangements and the dissemination of results. The transfer of militarily and economically significant technology can lead to changes in national security and competitive position. The means by which governments attempt to control such transfer include classification of military secrets, restriction of foreign visitor travel, and regulation of exports. The U. S. government, through executive order, has recently broadened the scope of security classification. There has been a heightened debate over the need for restrictions on the dissemination of unclassified research results, and discussions on the application of the International Traffic in Arms Regulations (ITAR) and the Export Administration Regulations (EAR) as controls on the distribution of information in fields that are considered to impact national interests. Concerns have been raised within the research community that these restrictions will retard the pace and quality of research. The National Academy of Sciences has offered to conduct a thorough review and evaluation of the technology transfer process and the various controls. The IEEE Board of Directors has established an ad hoc Committee on Technology Transfer, composed of representatives from EAB, PUB, TAB, and USAB, as the focal point for IEEE concerns with the various laws and regulations pertaining to technology transfer. The Committee will keep a record of instances where such controls have impeded the flow of technical information.

The United States Activities Board has proposed that the IEEE establish a Political Action Committee (PAC) on a three year pilot project basis, to enable IEEE members in the U. S. to make voluntary contributions to a PAC fund for political candidates. Opposition to the proposal was voiced at the February Technical Activities Board Meeting, and as a result the IEEE Executive Committee referred the proposal to The Institute for dissemination to the members, and to the major Boards, Societies and Sections for comment.

The IEEE Nuclear Testing Laboratory Accreditation Program was authorized last year in response to a request of the Nuclear Regulatory Commission. Currently the IEEE is preparing to offer accreditation services for laboratories that perform tests on safety-related equipment for nuclear power stations. The NRC plans to publish notice of its proposed rule endorsing the IEEE program and requiring its use after January 1, 1983. The Board of Directors has established an ad hoc oversight committee to provide periodic reviews and reports of the accreditation program.

Two of the IEEE Boards have been reorganized. The Standards Board has been moved from the jurisdiction of TAB to the Board of Directors, and the Educational Activities Board has substantially broadened its membership to include representatives of the other IEEE Boards and educational activities, as well as academic associations.

The rapid increase of activity in two technical areas has prompted requests for the formation of new IEEE entities. At the February meeting TAB approved in principle the formation of a Council on Fiber Optics. Representatives of the Communications, Electron Devices, Microwave Theory and Techniques, and Quantum Electronics and Applications Societies, as well as the Optical Society of America will meet to plan the publication of a journal devoted to this growing field. Also, a Committee on Robotics is being formed to determine an appropriate course for IEEE activity in this area, which is of fundamental interest to the Components, Hybrids, and Manufacturing Technology Society.

WHY AN IEEE IRA?

By Donald D. King, Chairman
Individual Benefits and Services Committee

Since the first of the year, banks and other financial institutions have put on a tremendous campaign to sell IRA's (Individual Retirement Accounts). In March, the IEEE joined in with a sponsored program. Why was

this done, and how does the new IRA program compare with other member benefits?

Pensions have been an important issue for IEEE members for years. The Individual Benefits and Services Committee was alert to this member interest and had examined various alternatives in depth. The tax law changes effective January 1, 1982 then made it feasible to offer a Retirement Investment Program to members. The announcement was delayed by legal and administrative arrangements until March. Under the previous law, self-employed persons, or employees not covered by a pension plan, could obtain Keogh or IRA plans respectively. The 1982 law extends IRA eligibility to all wage earners, whether covered by pension plans or not. This means that virtually all IEEE members are potential beneficiaries. Universal eligibility is an important factor, which has been a criterion for other IEEE member benefits. Basically, member benefits should be quantitatively available to all, and qualitatively worthwhile.

There are many types of IRA's available to the public and the choice to be made is a matter of personal financial planning. The particular plans offered under the IEEE Program are designed to offer a selection of mutual funds. Thereby, members have the opportunity to choose a plan to suit their needs, and also to make changes in the future, whenever they wish. The two large mutual fund organizations involved were selected by the IB&S Committee on the basis of the service they agreed to offer especially to IEEE members, and on their past record of performance.

Of course, no one can predict future financial results. However, the performance of the mutual funds in the program will be monitored, just as the performance of Life and Medical Insurance carriers is monitored by the IB&S Committee and its consultants. The combination of this regular review by IEEE members, flexible choice of mutual funds, and convenient, low cost administration is unique among the many publicly advertised plans available. As with other member benefits, there is no financial burden or responsibility involved for the IEEE. Only the numbers of participating members bring leverage for group advantages. These are more pronounced in the established Group Insurance Programs than in the IRA/KEOGH offering. However, the new IEEE Retirement Investment Program represents good value and convenience to members, and should become a key part of individual benefits.

1982 SENDAI SYMPOSIUM ON PERPENDICULAR MAGNETIC RECORDING

By: Dennis E. Speliotis, Advanced Development Corp.,
Lexington, MA 02173

This Symposium which took place at Tohoku University in Sendai, Japan, on March 11-12, 1982 was organized by Professor Iwasaki and his co-workers of the Research Institute of Electrical Communication of Tohoku University. This represents the first such Symposium dedicated exclusively to perpendicular recording. It was attended by 320 engineers and scientists from Japan, 4 from the US, and 3 from Italy. The presentations included 23 papers followed by a panel discussion. All the presentations and the Symposium proceedings were in Japanese except for the three papers from the US.

• Iwasaki (Tohoku University) presented the opening address describing the power and the explosive growth of perpendicular recording. In the short time interval from 1975 through 1981 he listed 216 publications on perpendicular recording of which only 33 have appeared in the English language and the remainder in Japanese. The achievements to date extend to linear densities of 200,000 bpi and track widths as narrow as 2 microns.

• Speliotis (Advanced Development) reviewed the various techniques of depositing perpendicular anisotropy media and concluded that purely perpendicular media will first be introduced in small flexible and rigid disk applications whereas other applications and particularly tape will follow an evolutionary approach utilizing isotropic or partially perpendicularly oriented dispersions of small (0.1 micron) particles of cobalt-impregnated iron oxide.

● Wuori (Vertimag) and Judy (University of Minnesota) reported on the mechanism of magnetization reversal in Co-Cr films concluding that the mode of reversal is by incoherent rotation (curling). They also showed demagnetization calculations supporting the great superiority of perpendicular recording at very high bit densities.

● Wuori et al reported on a single-sided perpendicular disk head which has been demonstrated to perform as well as the double-sided auxiliary pole type head and promises to attain even higher efficiency in the future.

● Nakamura and Iwasaki (Tohoku University) reported that the efficiency and resolution of the single pole head are comparable to a ring type head. They also reported that the noise characteristics of perpendicular recording media and heads are superior to those used for longitudinal recording.

● Hokkyo (Sony) reported on the recording performance of flexible disks of Co-Cr using a single pole head for writing and a ring head for reading. He obtained $D_{50} \approx 85$ Kbpi. He also reported on experimental and theoretical comparisons of the effect of media and head parameters on recording performance.

● Fujiwara and Yamamori (Toshiba) employed pulse width modulation (PWM) to record analog signals on perpendicular media. The recording resolution is far beyond the reproduction resolution. They inferred from their data that recording transitions as close as 625 \AA apart can be supported by perpendicular media.

● Nakagawa (NHK) presented a general review of modulation techniques with emphasis on partial response digital recording and the second peak of perpendicular for FM stereo and VTR applications.

● Okuwaki et al (Hitachi) reported on recording measurements on a rigid disk with a ring head. They obtained $D_{50} = 70$ Kbpi, SNR = 60 dB at 60 Kbpi, and overwrite of 24 dB for a 66 Kbpi signal written over a 35 Kbpi signal. They also reported good video recording on the same CoCr medium.

● Toki et al (NEC) reported on single pole heads and double-sided double-layer flexible disk media. Some problems in crosstalk and erasure were encountered and some solutions for these problems were investigated. They also reported on recording and observing (by Bitter patterns) very narrow tracks (2 microns).

● Tatsuta (Fujitsu) reported on experimental studies using rigid disks and all possible combinations of single pole and ring type heads. He concluded that single pole write and ring type read is the best combination, and that head-to-disk spacing is the primary limitation in obtaining the very high densities promised by perpendicular recording.

● Otsubo et al (Yamagata University) reported on some novel type heads (wedge type) for perpendicular recording.

● Tsuya et al (Tohoku University) reported on the properties of rapidly quenched Sendust ribbon for recording head applications.

● Shimada and Kojima (Tohoku University) reported on soft magnetic films of CoZr and how to improve their thermal stability by addition of Nb.

● Sakurai (Osaka University) reported on magneto-optic studies on amorphous films of Gd-Co with perpendicular anisotropy.

● Ouchi and Iwasaki (Tohoku University) gave a general review of CoCr films with a detailed discussion of microstructure including observations of the magnetization in single layer and double layer films using Lorentz electron microscopy in a 1 MeV electron microscope. For good performance at very high bit densities it is very important to have a very smooth film surface but the magnetic properties of the film do not have to be controlled very strictly. However, if one is using a ring head for writing, one needs to employ films with a higher degree of perpendicular anisotropy.

● Kobayashi and Funaki (Anelva) reported on using a magnetron sputtering system for depositing a double layer film on both sides of a continuous web film. They have achieved good homogeneity and good properties at a throughput rate of 5cm per minute, and this speed can be increased by using larger targets and higher sputtering power.

● Sugita and Kobayashi (Matsushita) reported on the fabrication of perpendicular media on a continuous web film using electron beam vacuum evaporation at the phenomenal rate of $6000 \text{ \AA}/\text{sec}$. To achieve good magnetic properties they had to maintain a substrate temperature above 300°C . To withstand this temperature they used a special "high temperature polymer" film substrate.

● Naoe et al (Tokyo Inst. of Tech.) reported on the fabrication of Fe-Ni and Co-Cr films by two facing target magnetron sputtering at fairly high rates ($300 \text{ \AA}/\text{min}$.) on polyimide films.

● Uesaka et al (Hitachi) proposed a model for magnetization reversal which could explain the discrepancy in the anisotropy field correction. They also reported that Co-Cr films deposited on amorphous substrates exhibit better orientation of the C-axis perpendicular to the film plane than those on permalloy films.

● Kobayashi et al (Fujitsu) reported on recording studies of rigid disks with a thin titanium underlayer. Using a very small gap (0.12 micron) ring head and a very small flying height (0.065 micron) they obtained $D_{50} = 70$ Kbpi and overwrite of -30 dB.

● Maeda et al (NTT) reported on a comparative study of sputtered and evaporated films of Co-Cr and Co-Ru. They also investigated the annealing properties and the temperature dependence of these films.

● Goto et al (NEC) reported on chemically plated films of CoNi-P with small amounts of Mn or W, which exhibit perpendicular anisotropy. They measured a $D_{50} = 18000$ frpi in a 5 micron thick film.

Panel Discussion

● T. Fujiwara (Toshiba) stated that one of the best applications of perpendicular recording is for digital audio using PWM encoding. They have attained in the laboratory a $D_{50} = 130$ Kbpi.

● J. Hokkyo (Sony) spoke about the application of perpendicular recording to video, and how it would permit the development of extremely compact VTR. They also have attained $D_{50} = 130$ Kbpi on flexible disks with a very narrow gap (0.1 - 0.15 micron) ring type head.

● H. Fujiwara (Hitachi) spoke of the need to optimize head design in order to realize the maximum potential of perpendicular recording. He showed experimental data with $D_{50} = 70-80$ Kbpi using a ring type head and simulation data with $D_{50} = 100$ Kbpi using a special design composite head. To fully utilize perpendicular recording we should go to much higher recording densities (2 orders of magnitude higher areal density), but we would then need special sensing techniques which are yet to be developed.

● T. Tatsuta (Fujitsu) stated that flexible disks can attain higher recording density than rigid disks because of the smaller head-to-disk spacing. The nearest target for perpendicular recording on rigid disks is about 50 Kbpi and 2 Ktpi, and using a single pole write and MR or ring head read.

● K. Nishimoto (NEC) talked about low cost flexible disk applications of perpendicular recording utilizing a single sided head (inductive write - MR read). These disks will require proper lubrication to minimize wear problems.

● H. Kobayashi (Anelva) claimed that the production capacity of a magnetron sputtering system is greater than that of an evaporation system when one includes maintenance. This claim was contested by R. Sugita of Matsushita, who is a proponent of vacuum evaporation.

● D. Speliotis (Advanced Development) spoke about possible challenges to magnetic recording from optical and electron beam addressable memories. He concluded that the only possible threat could come from electron beams but the prospects of any significant competition to magnetic recording are dim because perpendicular recording is extremely powerful, it is an entrenched technology, and it is cost effectively applicable to small as well as large systems extending from the home to the largest computer storage applications and including the consumer audio-video market.

● J. Judy (Univ. of Minnesota) spoke about the enormous future potential of perpendicular recording and showed that demagnetization is very low and the

energy per bit is very substantial even when you consider bit sizes approaching the dimensions of the "columns" in the columnar structure of Co-Cr.

● H. Kobayashi (Waseda University) spoke about the need to have very large capacity storage, and for some applications very high volumetric efficiency, and how perpendicular recording is an excellent technology to meet these requirements.

In summary, this Symposium presented an excellent view of the status of perpendicular recording. It painted a very optimistic picture of the power and of the future of the technology. It also underlined the large emphasis that is placed on this technology by a multitude of industrial and university laboratories in Japan, which contrasts sharply with the much smaller effort elsewhere in the world.

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Advanced Development Corporation

F.P. MAYER ELECTED IEEE FELLOW

Dr. Ferdy P. M. Mayer of the Laboratoire d'Electrotechnique et d'Automatique Dauphinois, Maisons-Alfert, France was cited "for contributions to the theory of ferromagnetics and to the development of materials for the suppression of electromagnetic interference."

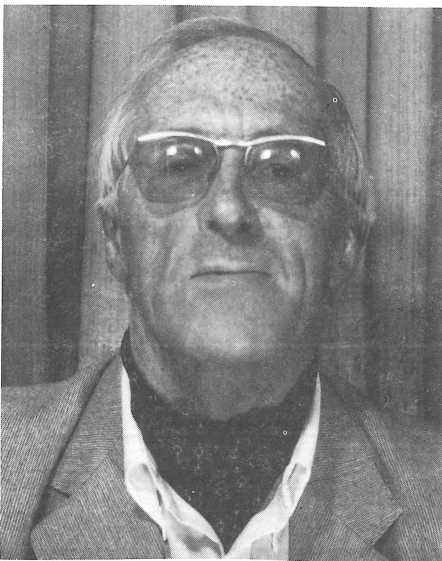
Ferdy Mayer (SM'60) was born in the Grand Duchy of Luxembourg on August 19, 1926. He received IEG degree in electronics engineering in 1950, and the doctoral degree in physics from the University of Grenoble, France, in 1956.

Between 1954 and 1957 he was associate professor in Industrial Electronics at the University of Grenoble; between 1957 and 1961 he has been Professor and Scientific Adviser at the University of Paris (ISEP) and the University of Lille (ISEN); since 1971 he has been Professor of Management of Research and Development and Politics of Innovation, and Member of the Board of Regents at the University of Grenoble.

In 1957 he formed a Contract Research Company L.E.A.D. (Laboratoire d'Electronique et d'Automatique Dauphinois) in Grenoble, where he holds the position of President and Director General.

In 1977 he formed an independent business office in the U. S. in Los Angeles. Dr. Mayer holds the position of President of LEAD-US.

He is actively interested in the field of solid-state physics, especially dielectrics and ferromagnetics, propagation, industrial electronics and control automotive electronics. He has published more than fifty papers and several books in technical and managerial areas of interest, and holds over 200 patents.



Dr. Ferdy P. Mayer

INTELEC '82 Oct. 3-6, WASHINGTON, DC

The fourth International Telecommunications Energy Conference (INTELEC '82) will be held October 3-6, 1982, at the Sheraton Washington Hotel, Washington, DC. INTELEC '82 is an international forum for the exchange of information on energy and power for telecommunications. Over 500 technical and management people from two dozen countries are expected to attend. Approximately 80 papers of broad interest to all areas of the telecommunications power industry are expected to be present. A strong exhibit program is also planned.

For additional information, contact M. E. Jacobs, Bell Laboratories, 8C-161, Whippany Road, Whippany, New Jersey 07981 (201) 386-3362.

INTELEC '83, OCT. 18-21, 1983, TOKYO

The Fifth International Telecommunications Energy Conference, 18-21 October, 1983, will be held at the Hotel Pacific, Tokyo, Japan. The General Chairman is S. Oshima (KEC). The Vice Chairmen are K. Harada (Kyushu Univ.) and E. Shikiba (NTT).

The Fifth International Telecommunications Energy Conference is being organized by the Institute of Electronics and Communication Engineers of Japan (the Professional Group for Power Engineering in Electronics and Communications) in association with the Institute of Electrical and Electronics Engineers, Inc. (Communications Society), and others.

Papers are solicited in the following areas:

Power Technology for Electronics and Communications: Electronics, Magnetics, Devices, Components, Circuits/DC Power Plants, Rectifiers, DC-DC Converters/AC Power Plants, Uninterruptible Power Systems, Inverters/Dedicated Power for Communication Systems/Built in Power Supply for Consumers' Home Equipment/Prime and Stand-By Power and Energy Storage, Engine-alternators, Batteries, Solar Systems, Fuel Cells and other alternate sources of energy/Power Distribution/Power System Supervision and Control/Physical Design and Testing/Reliability/Electromagnetic Interference and susceptibility/Energy Economics and Conservation/Building and Environmental Systems/International and Domestic Telecommunications Power Standards and Specifications/Others.

There will be an associated exhibition which will allow manufacturers to display their latest equipment and components.

A social program will be arranged.

Further information can be obtained by contacting the Secretary of INTELEC 83: Mr. K. Yamamura (Secretary of INTELEC 83), c/o International Congress Service, Inc., 5th floor of Chikusen Building, 2-7-4 Nihombashi, Chuo-ku, Tokyo 103.

CONFERENCE CALENDAR

3rd Joint Intermag-MMM Conf., July 20-23, 1982, Montreal.

10th Int. Colloquium on Magnetic Films & Surfaces, Yokohama, Sept. 13-16, 1982.

INTELEC '82, Oct. 3-6, 1982, Washington, DC (see announcement).

Materials Research Society Symposium on Superconductivity materials, Boston, Nov. 1-4, 1982. Contact R. H. Geballe, W. W. Hansen Res. Lab., Dept. of Applied Physics, Stanford University, Stanford, CA 94305, (415) 497-0215, or J. Bevk, Bell Laboratories, 6E-328, 600 Mountain Avenue, Murray Hill, NJ 07974, (201) 582-5913.

1982 Applied Superconductivity Conf., Nov. 30-Dec. 3, Knoxville, Tenn.

3rd Int. Conf. on Mag. Fluids, June 28-30, 1983, Univ. College of North Wales, Bangor.

INTELEC '83, Oct. 18-21, 1983, Tokyo (see announcement).

JOIN THE IEEE MAGNETICS SOCIETY TODAY

Membership in the IEEE Magnetics Society entitles you to receive, for the low Society fee, the IEEE Transactions on Magnetics, and the quarterly Magnetics Society Newsletter. You are kept informed of latest developments, meetings, and conferences in your areas of interest, and are entitled to purchase informative conference records and other helpful educational aids at greatly reduced rates for members.

Use the convenient coupon to become a member of the IEEE Magnetics Society. If you are not a member of the IEEE, but would like to join, please check the appropriate box on the coupon. Descriptive materials and an IEEE membership application will be sent to you upon receipt.

Society Fee: \$7.00 for IEEE members of all grades except Student.

Student Fee: \$3.00. These rates apply to payments received September 1 through February. On payments received March 1 through August 31, remit one-half of the above rates. (Payments received September 1 through December 31 apply through December 31 of the following year.)

MEMBERSHIP APPLICATION/ IEEE MAGNETICS SOCIETY

Send to: IEEE Service Center, 445 Hoes Lane,
Piscataway, NJ 08854.

_____ I am a _____ member of IEEE and hereby
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payable to IEEE).

_____ I am not a member of the IEEE but would like
to join. Please send information.

_____ I am interested in becoming a MAGNETICS Society
affiliate. Please send information.

Name _____ IEEE No. _____

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City _____ State/Country _____ Zip _____

Company _____

Field of Interest _____

(Please show this message to a colleague in magnetics who could benefit from membership in the Magnetism Society.)

JOIN THE MAGNETICS SOCIETY

If you are not yet a member of the IEEE Magnetism Society and are involved in magnetism research, development or engineering, the Society could make a valuable contribution to your professional activities.

You will join over 2000 colleagues in belonging to the only society in this country devoted solely to the interests of those who work in magnetism.

You will have the opportunity of contributing to your profession through membership in its Society and participation in the work of its technical and administrative committees.

You will receive bimonthly the Magnetism Transactions-- recognized throughout the world as a leading publication in applied magnetism.

The Society sponsors the INTERMAG Conference and co-sponsors the Conference on Magnetism and Magnetic Materials, which jointly cover the whole subject of magnetism.

Fill out the application blank today. For additional information, you may contact: E. J. Torok, Membership Chairman of the Magnetism Society, Sperry Univac, ULT25, P. O. Box 3525, St. Paul, Minn. 55165.



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